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ON THE VARIABILITY OF HR 4511

HR 4511 (HD 101947;  $\alpha_{1900} = 11^{\text{h}}38^{\text{m}}45^{\text{s}}$ ;  $\delta_{1900} = -61^{\circ}56'$ ) is a fifth magnitude supergiant of spectral type G0 Ia. It was pointed out earlier (Ferne 1976) that the star shows variability on a scale of about 0.1 mag in V with a period that is probably of the order of a month. The present note lists new observations that confirm this variability.

These observations are on the Johnson UBVRI system, and were obtained during June, 1976 with the University of Toronto's 61 cm telescope at the Las Campanas Observatory, Chile. HR 4475 (K1 III) and HR 4522 (G3 III) were used as comparison stars. Intercomparison of these two stars on seven nights gave no evidence of either being variable, and tie-ins to standard stars on those seven nights produced the following values:

	V	U-V	B-V	V-R	V-I
HR 4475:	5.137	2.183	1.101	0.820	1.365
	$\pm 0.004$	.002	.002	.004	.006
HR 4522:	4.103	1.462	0.892	0.677	1.110
	$\pm 0.004$	.003	.003	.003	.004

The quoted standard errors refer to the internal consistency of the observations only. Taking these values for HR 4522 as definitive for present purposes, differential observations between it and HR 4511 produced the following results for the latter:

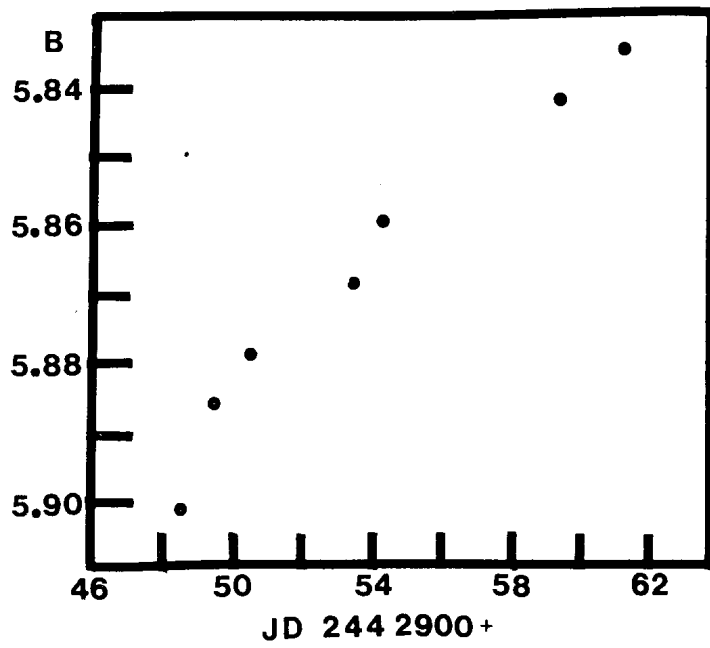
JD	V	U-V	B-V	V-R	V-I
2442948.481	5.077	1.153	0.824	0.664	1.102
49.487	5.063	1.165	0.823	0.666	1.092
50.475	5.057	1.163	0.822	0.661	1.087
53.460	5.054	1.155	0.815	0.655	1.085
54.464	5.042	1.159	0.818	0.651	1.075
59.471	5.036	1.136	0.806	0.644	1.079
61.483	5.041	1.122	0.794	0.649	1.082

The precision of these observations is estimated to be about  $\pm 0.005$  mag.

A small but definite trend in the observations is discernible, with the star becoming brighter and bluer during the run. Purely by way of illustration, Figure 1 shows the change in the B magnitude. The V magnitudes suggest the star was approaching maximum in this bandpass near the end of the run, but the change in magnitude with time earlier in the run is entirely consistent with that found previously (Ferne 1976).

Bidelman, Sahade, and Frieboes-Conde (1963) have already pointed out that HR 4511 is variable in radial velocity, and suggest that it is a spectroscopic binary. It seems more likely, however, (or perhaps additionally) that it is a long-period, low-amplitude cepheid. The long period is consistent with the spectral type of G0 Ia, and Bidelman et al. report H $\alpha$  (only) emission present on one plate, again characteristic of a long-period cepheid. The trend towards increasing blueness with increasing brightness is also to be expected.

Since long-period, low-amplitude cepheids are extremely difficult to find, this star could be of particular importance in cepheid research.



For instance, Madore (1976) has pointed out that there is conflicting evidence as to whether low-amplitude cepheids occur towards the blueward edge or the redward edge of the instability strip. This star probably lies towards the redward edge, and since it is bright and of low colour excess ( $E_{B-V} \approx 0.1$ ) it would be a useful tool in this regard.

A proper study of the star, however, will require the availability of extended observing time in the southern hemisphere, and I urge observers there to undertake such a study.

It is a pleasure to thank Dr. Karl Kamper for obtaining the present observations.

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References:

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